

1                   ABSTRACT OF THE INVENTION

2                   A process for removing heavy metals from water is provided. The process includes  
3                   the steps of introducing magnetite to a quantity of water containing heavy metal. The  
4                   magnetite is mixed with the water such that at least a portion of, and preferably the majority  
5                   of, the heavy metal in the water is bound to the magnetite. Once this occurs the magnetite  
6                   and absorbed metal is removed from the water by application of a magnetic field. In most  
7                   applications the process is achieved by flowing the water through a solid magnetized matrix,  
8                   such as steel wool, such that the magnetite magnetically binds to the solid matrix. The  
9                   magnetized matrix preferably has remnant magnetism, but may also be subject to an  
10                  externally applied magnetic field. Once the magnetite and associated heavy metal is bound  
11                  to the matrix, it can be removed and disposed of, such as by reverse water or air and water  
12                  flow through the matrix. The magnetite may be formed in-situ by the addition of the  
13                  necessary quantities of Fe(II) and Fe(III) ions, or pre-formed magnetite may be added, or a  
14                  combination of seed and in-situ formation may be used. The invention also relates to an  
15                  apparatus for performing the removal of heavy metals from water using the process outlined  
16                  above.

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